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NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

Job No: CTCE/BBMP/WNo03/KRIDL/WMM/AIV/2014-15 10.05.2014

Aggregate Impact Value

IS: 2386 Part IV

Customer	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements to Main and Cross Roads, Construction of drains in G. P. [illegible] Layout in Attur Ward No. 03 of Yelahanaka Satellite Town Sub Division, BBMP Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	10.05.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	81	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	299	
4	Aggregate Impact value = percent fines	21.20	22.34	
5	100* (W_2/W_1)%			21.77

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of Work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	10.05.2014

Result : Flakiness Index = 11.37%

Elongation Index = 13.26%

Result : Combined Flakiness & Elongation Index 24.63%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Notes:

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Job No: CTCE/BBMP/Work-9/KRIDL/BCQR/2014-15 28.05.2014

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
AGENCY	:	Technical Manager (West), KRIDL, Bangalore.
NAME OF THE WORK	:	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No: 89 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
REFERENCE	:	BBMP/AEE/YSSD/445/2013-14
SAMPLE ID	:	Bitumen
PERIOD OF TESTING	:	28.05.2014

The results of the tests conducted on the bitumen sample using for Bituminous Concrete.

SL No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS-1203-1978 (RA-2009)	69	60 to 70
2	Softening point, °C	IS-1205-1978 (RA-2009)	48	Min. 45
3	Ductility at 27 °C, cm	IS-1208-1978 (RA-2009)	100 >	Min. 50
4	Flash Point, °C	IS-1209-1978 (RA-2009)	290	Min. 220

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Lab No: CTCE/BBMP/WNo.03/KRIDL_BC/AIV/2014-15 28.05.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	28.05.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	81	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	300	
4	Aggregate Impact value = percent fines = $(W_2/W_1)*100$ %	21.20	22.08	21.64

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%.

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CTCE/BBMP/WN008/KRIDL/BC/ATV/2014-15 28/05/2014

Aggregate Impact Value

IS: 2386 Part IV

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No. 09 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	28.05.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	386	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	83	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	299	
4	Aggregate Impact value = percent fines $100 (W_2/W_1)$%	21.73	22.54	22.13

JE 22.13

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Lab No: CTCE/BBMP/WSno:03/KRIDL-BC/AIV/2014-15 28/05/2014

Aggregate Impact Value
IS: 2386 Part IV

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanaka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	28/05/2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	382	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	80	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	298	
4	Aggregate Impact value = percent fines $100 * (W_2/W_1)$ %	21.11	21.99	21.55

Comments:
→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%.

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Job No.: CTCE/BBMP/WN-03/KRIDL/10/Slope_1/2014-15 28.05.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of Work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	28.05.2014

Result : Flakiness Index = **11.28%**

Elongation Index = **13.62%**

Result : Combined Flakiness & Elongation index **24.90%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

Notes:

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Lab No: CTCE/BRMP/WNo.65/KRIDL/30/Slab/2/2014-15 28.05.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer**, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West)**, KRIDL, Bangalore.
Name of Work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Ward No. 65 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Technical Reference	IS 2386(Part I) 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	28.05.2014

Result : Flakiness Index = **11.75%**

Elongation Index = **13.29%**

Result : Combined Flakiness & Elongation index **25.04%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%.

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Job No: CTCE/BBMP/WN-03/KRIDL/BC/Stripping/2014-15 30/05/2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Amru Ward No. 03 of Yelahanaka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Type of Mix	Bituminous Concrete
Date of Testing	30/05/2014

Type of binder : 60/70

Percentage of binder used : 5.0 % by wt.

Total weight of aggregate : 200 g

Total weight of binder : 200 g

Temperature of water bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	2.7	2.90	97.10
2	2.9		
3	3.1		

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%

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Job No: CTCE/BBMP/WNo-03/KRIDL_W_Sp_Wa/2014-15 30.05.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Type of Mix	Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	30.05.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2021	2022	2025	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_3$ g	1271	1272	1275	
4	Weight of saturated surface dry aggregate in air	W_4 g	2040	2042	2045	
5	Weight of water equal to the volume of the aggregate	$(W_4 - W_5)$ g	769	770	770	
6	Weight of oven dried aggregate	W_5 g	2021	2020	2025	
7	Specific Gravity	$W_5/(W_4-W_3)$	2.628	2.623	2.630	2.627
8	Apparent Specific gravity	$W_5/(W_5-W_3)$	2.695	2.701	2.700	2.698
9	Water Absorption	$(W_4-W_5)*100/W_5$	0.94%	1.09%	0.99%	1.01%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%.

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Lab No.: CTCE/BBMP/WNo.03/KRIDL/BC/Bitumen/2014-15 30.05.2014

BITUMEN DETERMINATION OF BITUMINOUS CONCRETE MIX

AS per IRC : SP : 11 - 1984

CLIENT	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
AGENCY	Technical Manager (West), KRIDL, Bangalore.
NAME OF THE WORK	Improvements to Main and Cross Roads; Construction of drains in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/AEE/YSSD/445/2013-14
SAMPLE I/D	Main and Cross Roads in G. Ramaiah Layout in Attur Ward No.03
DATE OF TESTING	30.05.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	469.5	470.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g (corrected)	30.5	29.50
7. Bitumen content in %	6.10	5.90
8. Average	6.00	

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Aggregate Gradation Test

IS : 2386 Part I

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements to Main and Cross Roads, Construction of drains in Ex. Ramaiah Layout in Ward No. 63 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/445/2013-14
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete (BC)
Date of Testing	30.05.2014

Total Weight of Sample: 5625 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	458	8.1	8.14	91.86	90-100	
4.75	2882	51.2	59.38	40.62	35-51	
2.36	783	13.9	73.30	26.70	24-39	
1.18	451	8.0	81.32	18.68	15-30	
0.3	386	6.9	88.18	11.82	9-19	
0.075	325	5.8	93.96	6.04	3-8	

Total Weight of Sample: 5650 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	375	6.6	6.64	93.36	90-100	
4.75	3062	54.2	60.83	39.17	35-51	
2.36	629	11.1	71.96	28.04	24-39	
1.18	434	7.7	79.65	20.35	15-30	
0.3	345	6.1	85.75	14.25	9-19	
0.075	495	8.8	91.51	5.49	3-8	

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Lab No: CTCE/BBMP/WN-03/KRIDL/BC/Stability/2014-15 30.05.2014

TEST REPORT ON STABILITY OF MIX

Client	:	**Asst. Executive Engineer,** Yelahanka Satellite Town Sub Division, BBMP, Bangalore
Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
Name of the Work	:	Improvements to Main and Cross Roads, Construction of drains in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference		BBMP/AEE/YSSD/445/2013-14
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	30.05.2014

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No.	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	10.30	9.75	9 Kn min
2	Marshal flow, mm	3.15	3.10	2 – 4
3	Percent air voids in Mineral Aggregate	14.20	13.45	13 – 15
4	Voids in Compacted Mix	4.33	3.80	3 – 6
5	Percent Voids filled with Bitumen	69.80	70.15	65 - 75
6	Density, g/cc	2.27	2.26	

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